

U.S. Serial No. 10/813,719 (Attorney Dkt: HALB:051)
Art Unit: 1797; Examiner GAKH, YELENA G.

REMARKS/ARGUMENTS

I. General Remarks

Please consider the application in view of the following remarks.

II. Disposition of Claims

Claims 1-45 are pending in this application. Claims 1-21 and 32-38 have been withdrawn pursuant to a restriction requirement. Claims 1, 4, 8, 9-14, 32-33, and 35-38 have been amended herein. Claims 5-7, 15-16, 19-21, and 34 have been canceled.

III. Restriction/Election Requirement

Applicants confirm that the Examiner required restriction of the claims, dividing the claims into two groups as follows: Group I—Claims 1-21 and 32-38, drawn to a method of distinguishing oil based drilling fluid; and Group II—Claims 22-31 and 39-45, drawn to a drilling fluid, method of use, and method of its preparation. Applicants also confirm election by their counsel Craig W. Roddy, in a telephone conversation with the Examiner, of the Group I claims for examination, that is, claims 1-21 and claims 32-38, all without traverse.

IV. Double Patenting

The Examiner has advised that in the event claims 4 and 33 should be found allowable, claims 5 and 34 would be objected to as being a substantial duplicate. Applicants would traverse such rejection because in their view to be "soluble" is not exactly the same as having been "solubilized." Applicants appreciate however that the two concepts seem related and that a species that would not be naturally soluble could be solubilized. See Applicants' discussion in paragraph numbered [0023] of their specification. To address the Examiner's concern, Applicants have amended claims 4 and 33 to include alternative language—"soluble or solubilized" and have canceled claims 5 and 34.

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V. Rejection of Claims – 35 U.S.C. § 112, First Paragraph

The Examiner has rejected claims 1-21 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. With respect to rejecting claims 1-7, the Examiner has stated:

The specification does not provide an adequate disclosure for the method recited in the claims, because it is silent regarding interference of paramagnetic species infiltrated into formation fluid from oil-based drilling fluid, which can be easily intermixed with the formation fluids, see Raamakrishnan et al. (US 7,134,500), ‘when a well is drilled with oil-based-mud (OBM) the filtrate may miscibly mix with the formation fluid’ (see col. 1, lines 48-50).

Applicants respectfully traverse this position by the Examiner and the Examiner's rejections based on such position. MPEP Section 2164 states in part that: “The purpose of the requirement that the specification describe the invention in such terms that one skilled in the art can make and use the claimed invention is to ensure that the invention is communicated to the interested public in a meaningful way. The information contained in the disclosure of an application must be sufficient to inform those skilled in the relevant art how to both make and use the claimed invention. . . . Detailed procedures for making and using the invention may not be necessary if the description of the invention itself is sufficient to permit those skilled in the art to make and use the invention.” [MPEP § 2164 (emphasis added)] Moreover, the law is well established that, “Enablement is a legal determination of whether a patent enables one skilled in the art to make and use the claimed invention. . . . Furthermore, a patent need not teach, and preferably omits, what is well known in the art.” *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987)(emphasis added).

Applicants have specifically taught in their specification, to one skilled in the art, that:

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[0011] The paramagnetic species shorten the NMR/T1 and T2 responses of the oil or synthetic base comprising the drilling fluid to 10-100 milliseconds at typical formation or laboratory temperatures thereby causing the response to be sufficiently different from the NMR/T1 and T2 responses of native or residual hydrocarbons to distinguish them. Generally, the change in T1 and T2 relaxation rates for the drilling fluid is proportional to the concentration of paramagnetic species present.

[0022] The method of the invention requires doping of the oil-based drilling fluid with oil soluble or oil solubilized paramagnetic species. Generally, the greater the concentration of such paramagnetic species in the fluid, the greater the enhancement in the contrast in NMR response of the drilling fluid when compared to the NMR response of formation hydrocarbons. However, addition of even a small amount of oil soluble or oil solubilized paramagnetic species to oil-based drilling fluid causes a shift in the NMR response that distinguishes the drilling fluid from formation hydrocarbons. Preferably an amount of the paramagnetic species is used so that a quantitative determination of any drilling fluid that filters into the formation may be made as well as detection of the drilling fluid in the formation.

[0024] Preferably, the particular paramagnetic species selected for use is chosen with characteristics of the subterranean formation in mind so that the paramagnetic species selected will be of the type that will not interact with the formation. Manganese ions, for example, may interact with some formations.

[0025] The time for doping the oil-based drilling fluid with the paramagnetic species according to the invention will depend on the type of NMR testing planned and the purpose or end result of the testing. For example, if one or more cores are to be taken from the formation for laboratory NMR testing, perhaps for example to determine oil saturation, then the paramagnetic species should preferably be added to the drilling fluid before the borehole is drilled through the portion of the formation from which such cores are to be taken. For another example, if an NMR wireline tool is to be used for downhole testing in the borehole, then the paramagnetic species might be added to the drilling fluid before or at about the same time the drilling of the borehole is begun or at some later time during drilling of the borehole. Again, however, the paramagnetic species should be added to the drilling fluid before drilling through the portion of the formation to be tested.

"Without a reason to doubt the truth of the statements made in the patent application, the application must be considered enabling." Training Material for Examining Patent Applications With Respect to 35 U.S.C. Section 112, First Paragraph—Enablement of Chemical/Biotechnical Applications, Part II(B), at <http://www1.uspto.gov/go/pac/dapp/lpecba.htm>.

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In rejecting claims 1-7 under 35 U.S.C. § 112, first paragraph, the Examiner has stated further that:

The examples of the instant specification demonstrate a predictable result of shortening T₂ times and as a result broadening lines in NMR spectra, for the pure drilling fluid, with the broadening increased proportionally with the concentration of the paramagnetic species. The examples do not demonstrate a possibility of 'distinguishing oil based drilling fluid from subterranean formation fluid', as recited in claim 1, unless the samples are the separate samples for the drilling fluid containing paramagnetic species and for the pure formation fluid. Moreover, the spectra of pure formation fluid should be *a priori* known, since first, formation fluids often comprise paramagnetic impurities, see e.g. Kleinberg US 6,346,813: '[some crude oils have significant amounts of vanadium or nickel [Tissot and Welte, 'Petroleum Formation and Occurrence', Springer-Verlag, 1978, Figure IV.1.20]. Because the relaxation effect is proportional to paramagnetic concentration, the proportions of two oils in a mixture can be monitored. Deliberate introduction of an oil-soluble paramagnetic substance into the oil base mud can considerably enhance this effect when the native crude is relatively free of paramagnetic material' (col. 8, lines 9-18). Moreover, broadening the lines due to shortening T₂ relaxation times is relative and can be compared only for the same sample with and without paramagnetic species. According to claims 1, 8, 11, 14, 19, 29, and 32 the samples are mixtures of the drilling fluid with paramagnetic species and a formation fluid. The paramagnetic species will affect the NMR spectra of subterranean formation the same way they affect oil-base fluid unless this is a natural gas formation, see Vinegar et al. (US 5,498,960). However, in this case, the NMR measurements require specific set-up not disclosed in the instant application (see Vinegar, cols. 1 and 2).

Applicants respectfully traverse this position by the Examiner and the rejections based on this position. The Examiner appears to be indicating that the samples provided by Applicants should have compared NMR spectra of drilling fluid doped according to the invention and native oil or hydrocarbons produced from a formation. However, the NMR spectra of native oil or hydrocarbons produced from a formation would be proprietary to the customers of Applicants' Assignee. This being said, Applicants have specifically taught that a distinction can be made and Vinegar does not teach the contrary. Vinegar is focused on obtaining different NMR spectra for hydrocarbon gas and Applicants respectfully submit does not support the assertion and summary conclusion the Examiner has made that the "paramagnetic species will affect the NMR spectra of

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subterranean formation the same way they affect oil-base fluid unless this is a natural gas formation." Vinegar only indicates that prior art NMR logging tools were unable to measure gas. To Applicants' knowledge, Vinegar does not discuss the NMR spectra of a drilling fluid versus an NMR spectra of native oil or liquid hydrocarbons.

With respect to rejecting claims 8-10 under 35 U.S.C. 112, first paragraph, the Examiner has stated:

The specification does not adequately describe a method of detecting hydrocarbon-bearing zones in a formation by adding paramagnetic species to a drilling fluid, circulating the fluid in the borehole and acquiring NMR spectra of at least a portion of the formation. The steps do not seem to have any relation to each other and to the preamble of the claim, which renders the method recited in the claims un-enabled.

The Examiner has stated that "the same is true" in rejecting claim 11-13, since, according to the Examiner, "the steps of adding paramagnetic species to the drilling fluid, circulating the fluid in the borehole and acquiring NMR spectra of at least of [sic] portion of the formation do not have any relations with each other and do not enable the method recited in the claims."

Applicants respectfully traverse these rejections of claims 8-13 by the Examiner. As noted above, "[t]he information contained in the disclosure of an application must be sufficient to inform those skilled in the relevant art how to both make and use the claimed invention. Detailed procedures for making and using the invention may not be necessary if the description of the invention itself is sufficient to permit those skilled in the art to make and use the invention." [MPEP § 2164 (emphasis added)] Moreover, the law is well established that, "Enablement is a legal determination of whether a patent enables one skilled in the art to make and use the claimed invention. . . . Furthermore, a patent need not teach, and preferably omits, what is well known in the art." *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 U.S.P.Q. 81 (Fed. Cir. 1986)(emphasis added). Applicants respectfully submit that

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the Examiner's statements demonstrate that she is not one skilled in the art of the present invention, even though Applicants fully appreciate and greatly respect that the Examiner holds a PhD degree, has carefully reviewed Applicants' claims, and is no doubt very skilled or even super skilled in a science. Applicants respectfully submit that paragraphs [0009] through [0013] and [0021] through [0027] in their specification of the pending application clearly explain to one of skill in the art how to carry out their invention claimed.

The Examiner has also rejected claims 14-21 under 35 U.S.C. 112, first paragraph, for the following reasons:

because the specification, while being enabling for the method of analysis of a subterranean formation specifically for the presence of the drilling fluid filtrate in the formation under specific conditions, such as when the formation fluid itself does not contain any paramagnetic impurities and is not totally intermixed with the drilling fluid (see above), does not reasonably provide enablement for the method as recited in the claim. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. The specification does not enable any person of ordinary skill in the art to perform an analysis of the fluid in the formation using NMR. Only the presence of a filtrate of the drilling fluid in the formation fluid can be detected, and only under specific conditions, e.g. if the formation fluid does not contain paramagnetic impurities and is not totally intermixed with the drilling fluid, see above.

Applicants respectfully traverse these rejections for the reasons stated above in traversing the Examiner's rejections of claims 1-13.

Moreover, Applicants respectfully submit that the Examiner's concern that the formation fluid may on occasion contain certain paramagnetic impurities sounds more like an "indefiniteness" concern under Section 112 than an "enablement" concern under Section 112. Additionally, the reference the Examiner cites in support of her concern states more precisely that "many crude oils and most oil base mud filtrates have negligible magnetic content" and that the paramagnetic content of some oils is "vanadium or nickel." [Kleinberg US 6,346,813, col. 8, lines 9-11]. Even *arguendo*, assuming without admitting, for the sake of argument, that the

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Examiner is correct that Applicants' invention may not be effective or as effective in situations where the native oil naturally has paramagnetic content, the Federal Circuit has clearly stated that the fact that claims "include species that might not meet the objects of the invention does not by itself prove that one skilled in the art cannot ascertain the scope of the asserted claims." According to the Federal Circuit, claim language is not indefinite because it may cover or even covers some embodiments that may be inoperable. *Exxon Research and Engineering Co. v. United States*, 265 F.3d 1371, 60 U.S.P.Q.2d 1272, 1276, 1278, 1282 (Fed. Cir. 2001).

VI. Rejection of Claims – 35 U.S.C. § 112, Second Paragraph

The Examiner has rejected all pending claims 1-21 and 32-38 under 35 U.S.C. 112, second paragraph, as indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner has explained:

Claims 1-7 are not clear and definite, as to what is being tested by NMR spectroscopy. Moreover, testing with NMR is recited in the preamble of the claim, which makes it unclear, whether the step of NMR testing is an active step of the recited method.

Applicants respectfully traverse these rejections. The law is well established that patent claims should be read in the light of the specification, and "[i]f patent claims, read in the light of the specification, reasonably apprise one skilled in the art of the utilization and scope of the invention and if the language is as precise as the subject matter permits, the patent should not be deemed invalid for indefiniteness." *Andco Environmental Processes, Inc. v. Niagara Environmental Associates, Inc.*, 220 U.S.P.Q. 468 (N.Y. 1983). Absolute specificity and precision are not required. "The claims need only go so far as to apprise one reasonably skilled in the area of the true teaching of the invention. Mere breadth of a claim does not itself cause invalidation." *Id.* The requirements of Section 112, second paragraph, are satisfied as long as the meaning of the claims is clear in light of the specification and accompanying drawings.

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MPEP § 2173.02 instructs that, "The Examiner's focus during examination of claims for compliance with the requirement for definiteness of 35 U.S.C. 112, second paragraph, is whether the claim meets the threshold requirements of clarity and precision, not whether more suitable language or modes of expression are available. . . . Definiteness of claim language must be analyzed, not in a vacuum, but in light of: (A) The content of the particular application disclosure; (B) The teachings of the prior art; and (C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. . . ." Applicants respectfully submit that when their claims are read in light of their specification, the claims meet the requirements of 35 U.S.C. 112, second paragraph for definiteness.

The Examiner has further stated that:

It is not apparent, as to what is the difference between claim 4 and 5, since the paramagnetic species are added to the oil based drilling fluid, and therefore there is no difference between paramagnetic species being oil soluble and oil solubilized. The same is true for claims 33 and 34.

Applicants have addressed this concern of the Examiner above under Part IV—Double Patenting. Applicants respectfully traverse rejection of the claims for indefiniteness and refer the Examiner to discussion of oil soluble and oil solubilized in their specification at paragraph [0023].

Still further the Examiner has explained:

From claim 8 it is unapparent, as to how the preamble of the claim is related to the body of the claim, and how two first steps of the claim are related to the third step. It is not clear, how 'adding paramagnetic species to a drilling prior or during the drilling' and 'circulating said fluid in said borehole' and [sic] are related to 'acquiring nuclear magnetic resonance measurements of at least a portion of the formation', and how all these steps are related to the 'method of detecting hydrocarbon-bearing zones'.

Claims 8-10 are not clear and definite, as to what is meant by the expression 'detecting hydrocarbon-bearing zones'; does it mean that the tests are performed multiple

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times in the process of drilling until hydrocarbons are detected? Moreover, it is not apparent, as to how such detection depends on adding paramagnetic species to the oil-based drilling fluid? There is no apparent connection between three steps of the method recited in the claim and between the steps of the method and the preamble of the claim.

The same is true for claims 11-13.

Applicants respectfully traverse these rejections of claims 8-13 under 35 U.S.C. § 112, second paragraph for the reasons stated above concerning rejection of claims 1-7 under this section and paragraph. Also, the Federal Circuit has specifically stated that the purpose of claims is not to explain the technology or how it works. Rather, the purpose of claims is to state the legal boundaries of the patent grant. A claim is not "indefinite" simply because it is hard to understand when viewed without benefit of the specification. *S3Inc. v. nVIDIA Corp.*, 259 F.3d 1364, 59 U.S.P.Q.2d 1745, 1748 (Fed. Cir. 2001). Whether a claim is invalid for indefiniteness depends on whether those skilled in the art would understand the scope of the claim when the claim is read in the light of the specification. *Breuer Electric Mfg. Co. v. Tenant Co.*, 44 U.S.P.Q.2d 1259, 1266 (III. 1997). "A decision on whether a claim is invalid [for indefiniteness] requires a determination of whether those skilled in the art would understand what is claimed when the claim is read in light of the specification." *Rhône-Poulenc Agrochime S.A. v. Biagro, Western Sales Inc.*, 35 U.S.P.Q.2d 1203, 1205 (Cal. 1994). What an applicant does not regard as his invention need not be specified in the claims. *In re Wakefield and Foster*, 422 F.2d 897, 164 U.S.P.Q. 636 (C.C.P.A. 1970). Applicants respectfully submit that their claims are definite and understandable when read in light of the specification as required by law.

The Examiner has stated further:

Claim 14 recites 'a process of analyzing the fluid composition of a subterranean formation'. Conventionally subterranean formations are complex mixtures of hydrocarbons with overlapping signals in NMR spectra. It is totally unclear from the claim, how the step of adding paramagnetic species into the drilling fluid will enable such

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method. Moreover, the method of detecting a filtrate of the drilling fluid in the formation and analysis of the fluid composition of the formation are different methods.

Applicants respectfully traverse this rejection, which Applicants understand to be made by the Examiner under 35 U.S.C. § 112, second paragraph, even though the Examiner has referred to "enable" in the rejection. In any case, Applicants respectfully submit that the claim is clear when read by one of skill in the art in light of the specification and that the law requires no more. As the Court of Customs and Patent Appeals, predecessor to the Federal Circuit, explained in *In re Wakefield and Foster*, 422 F.2d 897, 164 U.S.P.Q. 636 (C.C.P.A. 1970), "Section 112 does not require that the claims define 'the invention,' whatever that would mean." The second paragraph of that section "requires that the claims define 'the subject matter which the applicant regards as his invention.' The meaning of this provision is simply that an applicant is required to set definite boundaries on the patent protection sought." What the applicant does not regard as an element of his invention need not be specified in the claims.

The Examiner has also stated:

Claim 19 is not written according to US practice. The claim should comprise a preamble and a body of the claim. It is not apparent, as to which method steps the claim recites.

Claims 32-38 provide for the use of the drilling fluid, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active positive steps delimiting how this use is actually practiced.

Claims 32-38 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Applicants respectfully traverse these rejections but have canceled claims 19 and 34 and have amended claims 32, 33, and 35-38 in an effort to moot the rejections in the interest of

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expediting prosecution. To those skilled in the art of drilling to ultimately recover oil from an oil bearing formation, drilling operations are well known to include use of a drilling fluid in drilling a borehole in the subterranean formation, well logging, and taking core samples from the formation.

VII. Rejection of Claims – 35 U.S.C. § 102

The Examiner has rejected claims 1-7 and 14-21 under 35 U.S.C. 102(b) as anticipated by Kleinberg (US 6,346,813). Specifically, the Examiner has stated that:

Kleinberg discloses ‘magnetic resonance method for characterizing fluid samples withdrawn form subsurface formations’ (title) and teaches, ‘[d]issolved paramagnetic compounds will reduce the proton relaxation times of oils. Thus if two oils have the same viscosity, they will have different relaxation times if they have substantially different paramagnetic content. While many crude oils and most oil base mud filtrates have negligible magnetic content, some crude oils have significant amounts of vanadian or nickel [Tissot and Welte, ‘Petroleum Formation and Occurrence’, Springer-Verlag, 1978, Figure IV.1.20]. Because the relaxation effect is proportional to paramagnetic concentration, the proportions of two oils in a mixture can be monitored. *Deliberate introduction of an oil-soluble paramagnetic substance into the oil base mud can considerably enhance this effect when the native crude is relatively free of paramagnetic material*’ “(col. 8, lines 5-18). Kleinberg specifically indicates that paramagnetic substances are salts of the transition metals: ‘[u]npaired electrons are found in naturally occurring or artificially introduced magnetic transition metal ions such as iron, manganese, chromium, cobalt, vanadium and nickel. These last two are frequently found in crude oils. Chromium is found at high concentration in a number of water base mud filtrates. Natural ground water has significant iron content. In general, mud filtrates and formation fluids will have different concentrations of transition metal ions’ (col. 9, lines 31-37).

Thus Kleinberg teaches adding oil-soluble paramagnetic species into the oil-based drilling mud during drilling operation (with inherent circulation of the fluid in the borehole) and differentiating the mud from the formation fluid using NMR spectra by determining different values of relaxation parameters of NMR spectra of the mud and the formation, which covers the subject matter of the indicated claims.

Applicants respectfully traverse the Examiner’s rejections but have amended the claims to emphasize distinguishing elements of Applicants’ invention. Applicants respectfully request the Examiner reconsider the claims in light of the amendments.

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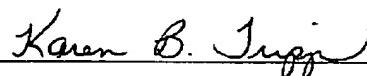
For anticipation under Section 102(b), the reference must have identity with the claims of Applicants' invention. Applicants respectfully submit that the Kleinberg reference does not have such identity and therefore cannot anticipate Applicants' invention as claimed. Kleinberg does not "disclose every element of the challenged claim[s]" as necessary for the reference to anticipate the claims. *PPG Industries, Inc. v. Guardian Industries Corp.*, 75 F.3d 1558, 37 U.S.P.Q.2d 1618 (Fed. Cir. 1996). The law is well settled that "to anticipate, every element and limitation of the claimed invention must be found in a single prior art reference, arranged as in the claim." E.g., *Brown v. 3M*, 265 F.3d 1349, 60 USPQ2d 1375 (Fed. Cir. 2001); *Electro Med. Sys. S.A. v. Dooper Life Sciences*, 34 F.3d 1048, 1052, 32 U.S.P.Q.2d 1017, 1019 (Fed. Cir. 1994) ("anticipation under 35 U.S.C. § 102 requires the disclosure in a single piece of prior art of each and every limitation of a claimed invention").

SUMMARY

Applicants respectfully submit that the claims as amended are now in condition for allowance and Applicants respectfully request the Examiner to allow the application to proceed to issue.

Respectfully submitted,

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